

Exhibit 4

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

UNITED STATES OF AMERICA

v.

SAMUEL BANKMAN-FRIED,

Defendant.

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22 Cr. 673 (LAK)

EXPERT WITNESS DISCLOSURE
JOSEPH M. PIMBLEY, PH.D.

I. Background & Qualifications

1. I am currently the Principal at Maxwell Consulting, a consulting firm that specializes, among other things, in the review and analysis of financial risk management; review and creation of financial and mathematical models for purposes of risk assessment or valuation of derivatives, structured products, and other investments; credit risk and credit rating models; economic capital calculations; portfolio risk/return calculations; other cash flow or business optimization applications; consulting and expert testimony in connection with legal disputes involving structured products, credit ratings, derivatives, bond insurance, and securities trading; providing advisory opinions and compliance review of investment policies and their execution for the portfolios of endowments and other entities including corporate Treasuries, colleges/universities, insurance companies, and non-profits.
2. I have been active in the financial profession for more than 30 years in areas including derivatives and securities trading, portfolio and risk management, trading systems, credit ratings, structured finance, banking, investment advisory, consulting, financial litigation, and teaching.
3. I have published more than seventy articles in financial and economic journals and publications, provided more than seventy presentations for financial professionals on various topics in the capital markets, co-authored three books and contributed chapters to two others.
4. In addition to my published work, I have extensive experience managing risk and information technology systems, including financial databases and associated code layer, analyzing cashflows within transactions and across firms, and valuing illiquid securities and derivatives and have done consulting work as well as provided expert reports in various legal disputes and other litigation related to such activities and instruments.

5. I hold a Ph.D. in Theoretical Physics (1985), an M.S. in Physics (1981), and a B.S. in Physics (1980) (*summa cum laude* and minor in Mathematics) from Rensselaer Polytechnic Institute. I am a past member of the Editorial Board of the GARP (Global Association of Risk Professionals) *Risk Professional*, and have served on the Advisory Board of the Polytechnic University Center for Finance & Technology. I am also a member of Sigma Pi Sigma, the National Physics Honor Society, and was elected a Senior Member of the Institute of Electrical and Electronic Engineers (IEEE). I am a past member of Sigma Xi (scientific research society), the IEEE Election Devices Society, the Society for Industrial and Applied Mathematics (SIAM), and the American Association for the Advancement of Science (AAAS).
6. I am a past Member of the Executive Advisory Board for the Master's Degree "Quantitative Finance and Risk Analytics" program of the Lally School of Management at the Rensselaer Polytechnic Institute. I am also a past Member of the Strategic Advisory Board of ARMA International, LLC, an infrastructure engineering firm. I am also a past member of the Board of Directors of SOLVE, a financial technology firm.
7. I am the Editor of the *Journal of Derivatives*, a widely known and respected publication for financial professionals and academics.
8. My current *curriculum vitae* is attached as Appendix A. Appendix B lists all publications I have authored in the prior ten years. Appendix C lists the cases in which I have testified as an expert by deposition over the prior four years. I have not testified as an expert at trial over the prior four years.
9. I have no financial interest in the outcome of this case. I am being compensated for my time and services on an hourly basis at the billing rate of \$720 per hour with reimbursement for reasonable expenses. My compensation in this case is not in any way contingent or based on the opinions presented herein or on the outcome of these legal proceedings.

II. Scope and Summary of Opinions

If called as a witness, I may testify to the following opinions and issues:

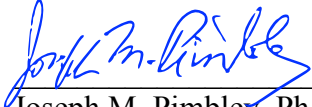
10. FTX's software infrastructure, in particular, its database and associated computer code that supported the financial exchange operation had insufficiently robust reporting and insufficient testing and quality assurance of data integrity and code. Due to the nature of FTX's databases and computer code, many of these deficiencies in the software infrastructure were not visible to external users or to recipients of infrastructure-generated risk and financial reports, including, for example, the fiat@ programming.
11. Present information concerning FTX's trading database and associated code level and data outputs therefrom, as well as analyses and calculations derived from its data. These analyses may include without limitation: certain account balances and their evolution over time, net-asset-value calculations, line of credit evolutions, transaction audit trail analysis, and calculations of FTX revenue and income.

12. Rebuttal of evidence or analyses presented by the Government of FTX's software infrastructure and trading data or financial information or of data results or analyses using FTX's software infrastructure and trading data or financial information.

III. Basis of Opinions

13. My opinions offered herein are based on my own academic and professional education, training, skill and knowledge regarding common and prevailing methods of computer coding and data retrieval of financial industry firms. I base my opinions also on my review of the snapshot produced of FTX's Amazon Web Services (AWS) database and the portions of the codebase produced in discovery. Additionally, I have studied selected documents that I list in Appendix D.

Respectfully submitted,


Joseph M. Pimbley, Ph.D.

APPENDIX A: Resume of Joseph M. Pimbley

Joseph M. Pimbley

Principal, *Maxwell Consulting, LLC*, March 2010 - Present

Member, *PF2 Securities*, January 2015 - Present

Editor, *Journal of Derivatives*, September 2018 - Present

Education

Ph.D. (Theoretical Physics) *Rensselaer Polytechnic Institute*, 1985

M.S. (Physics) *Rensselaer Polytechnic Institute*, 1981

B.S. (Physics) *Rensselaer Polytechnic Institute*, 1980
(*summa cum laude* and minor in Mathematics)

Board Positions

Editorial Board of *Risk Professional*, 2003 - 2018

Global Association of Risk Professionals

Board of Directors, 2013 - 2021

Solve Advisors, Inc.

Board of Directors, 2015 - 2020

Loud-Hailer, Inc.

Past Professional Experience

January 2021 – June 2021

Derivatives Strategist of *777 Partners, LLC*, a private equity firm. Responsible for creation of asset-backed security (ABS) transactions and the associated structuring, quantitative modeling, and credit rating agency relations and negotiations. Asset types for securitization included guaranteed and life-contingent structured settlements and commission and litigation receivables.

June 2008 – March 2010

Managing Director within the Financial Engineering practice of *Duff & Phelps, LLC* – a worldwide financial consulting firm. Activities included direct contact with clients (hedge funds, private equity firms, financial institutions) and review of client activities to formulate and execute beneficial advisory projects. Special focus was on derivative transactions and structured products (RMBS, CDOs, CMBS, *et cetera*). Leading role in the Lehman Brothers bankruptcy court Examiner investigation that yielded important findings for funding, leverage, collateral, liquidity, and valuation challenges that led to the bankruptcy.

March 2002 – May 2008

Executive Vice President and Head of Institutional Risk of *ACA Capital Holdings* (ACA), a hybrid financial products and insurance company with risk positions and assets under management exceeding \$90 billion. Reported to the CEO and to the Board of Directors. Responsible for firm-wide, enterprise risk management (ERM), quantitative modeling, information technology, and data integrity. Senior decision maker on Credit and Investment Committees for municipal bonds, structured bonds and products, bank loans, derivative transactions. Created proprietary cash-flow and *Monte Carlo* simulation models of credit, interest rate, and derivative pricing and risk for CDO and Structured Credit transactions in *Visual Basic* and C#. Recruited and managed a team of quantitative finance professionals. Managed the Information Technology function and led the technical development of proprietary database systems for trading and risk management. Chief Risk Officer of *ACA Capital Partners I* (a “credit hedge fund”) with oversight of investments, funding, risk assessment, and valuations.

July 1997 – February 2002

Senior Vice President and Credit Derivative Product Manager of *Sumitomo Mitsui Banking Corporation Capital Markets* (SMBC CM). Primary task was to lead the development of a business in credit derivatives. Duties included business development (products, distribution, *et cetera*), execution of trades, the construction of models (*Excel Visual Basic* and C/C++ routines with market data feeds) for pricing and risk management, and creation of necessary trading and operational systems. Primary focus was on managing economic and regulatory capital for the parent bank’s US and Asian corporate loan portfolio.

October 1995 - July 1997

Senior Risk Manager in the Capital Markets Services group of the *Financial Guaranty Insurance Company*. Responsible for all risks (market, credit, liquidity, operational, *et cetera*) in the firm’s (\$6 billion) financial services for municipalities (primarily guaranteed investment contracts and asset management). Managed the capital markets IT function. Helped conceive, launch, and obtain triple-A ratings for a new special-purpose vehicle.

May 1994 - October 1995

Senior Analyst in the *Structured Finance* group within the Corporate division of *Moody's Investors Service*. Primarily responsible for research in the credit and market

risks of structured notes and credit derivatives. The results of such research include the development of new rating businesses (*e.g.*, individual security and mutual fund market risk ratings) as well as *Moody's*, industry, and academic publications. Also active in rating guaranteed investment contracts (GICs), collateralized bond/loan obligations and other special purpose vehicles.

February 1993 - May 1994

Assistant Vice President in the *Risk Analytics* Unit of Citicorp North America Global Finance. Had primary responsibility for the analysis and measurement of credit risk in all "non-standard" and "emerging market" derivative transactions originating in North America, Latin America, South America and Southeast Asia. Such transactions included derivatives on equities, equity indices, debt securities, single currency interest rate swaps, cross currency swaps, foreign exchange contracts and commodities. Also responsible for validating and generating pricing models for derivative instruments. Activities required extensive computer model development (**FORTRAN**, **C** and spreadsheet programming) and daily communication with traders and financial engineers.

January 1987 - February 1993

Assistant Professor in the Department of Mathematical Sciences of Rensselaer Polytechnic Institute. Conducted independent research in the mathematics and physics of operation of various semiconductor devices. Discovered (with a colleague) a novel, *superresolution* spectral estimation algorithm. Taught classes on the subjects of ordinary differential equations (graduate and undergraduate), advanced mathematical modeling (graduate), numerical computing (undergraduate), probability, statistics and calculus with symbolic computing.

June 1980 - January 1987

Staff Physicist at the General Electric Corporate Research and Development Center, Schenectady, New York. Directed and coordinated the fabrication of Charge-Injection Device (solid-state) imagers. Suggested and studied design and fabrication innovations to improve quantum yield and signal/noise ratio of these imaging devices and won a 1982 (General Electric) Dushman Award for this advanced development work. Successfully led the development of a radiation-hard, MOS fabrication process. Studied channel hot electron reliability in short-channel NMOS FETs and made new contributions to this field. Derived and solved numerically a new set of semiconductor device equations for more accurate modeling of device physics.

Books

Joe Pimbley and Laurel McDevitt, *Banking on Failure*, Maxwell Consulting, LLC, ISBN-10: 069227426X, 2014.

Joe Pimbley and Laurel McDevitt, *Simple Money*, 2nd Edition, Maxwell Consulting, LLC, ISBN-10: 0615864627, 2013.

J. M. Pimbley, M. Ghezze, H. G. Parks and D. M. Brown, *Advanced CMOS Process Technology*, Academic Press, San Diego, 1989.

S. D. Silverstein and J. M. Pimbley, "The Minimum Free Energy Method of Spectral Estimation," chapter in *Advanced Signal Processing*, ed. S. Haykin, Prentice-Hall, 1991.

J. M. Pimbley, "Transistors", chapter in *Magill's Survey of Science: Applied Science*, F. N. Magill, editor, Salem Press, Pasadena, **ISBN 0-89356-705-1**, 1993.

Finance Articles

(Seventy-plus articles written for financial professionals on a wide range of topics in the capital markets from 1994 to the present. This list is available upon request. Five recent articles are cited below.)

J. M. Pimbley, "Testing and Mapping an Empirical Exercise Boundary for the American Put Option," *J. Derivatives*, Fall 2021.

J. M. Pimbley, "Efficient Routines for CDO Loss Calculations", *J. Structured Finance* **26**(1), 29-43, Spring 2020.

J. M. Pimbley and G. Phillips, "The *Myer* Ruling and its Limitations," *Commercial Law Quarterly*, **34**(1), March-May 2020.

J. M. Pimbley, "Simple Correlated Binomial Portfolio Loss Distribution", *J. Structured Finance* **25**(2), 75-86, Summer 2019.

J. M. Pimbley, "T-Vasicek Credit Portfolio Loss Distribution", *J. Structured Finance* **24**(3), 65-78, Fall 2018.

Quant Perspectives

(Monthly column for the *Risk News & Resources* publication of the *Global Association of Risk Professionals*)

Finance Public Presentations

(**Seventy-plus public presentations** for financial professionals on a wide range of topics in the capital markets from 1994 to the present. This list is available upon request. Four recent presentations are cited below.)

J. M. Pimbley and R. Chang, “Rapid Monte Carlo Simulation – Hands-On Learning,” invited lecture for *GARP 18th Annual Risk Management* Convention, New York, March 2017; also Industry Webcast “Rapid Monte Carlo Simulation,” May 2016.

J. M. Pimbley, “Mathematical Finance, Models, Simulation and Today’s Pressing Problem”, invited lecture for *INFORMS 2016*, Nashville, November 2016.

J. M. Pimbley and S. R. Lindo, “Flight Simulator for Banking,” invited PRMIA Webcast, October 2015.

J. M. Pimbley, “Data, Models & Concepts for Quantitative Finance”, GARP Webcast, August 2013 - includes autoregressive (AR) and other statistical time series analysis.

Journal Articles

(Nearly one hundred refereed articles in the fields of electrical, chemical, and nuclear engineering and semiconductor physics. This list is available upon request.)

PATENTS

J. M. Pimbley and H. R. Philipp, *Radiation Transmissive Electrode Structure*, 4,450,465, May 1984.

C.-Y. Wei and J. M. Pimbley, *Extended Drain Concept for Reduced Hot Electron Effect*, 4,613,882, September 1986.

R. D. Lillquist, J. M. Pimbley and T. L. Vogelsong, **Vipervision** *Composite Visible/Thermal Infrared Imaging System*, 4,679,068, July 1987.

C.-Y. Wei and J. M. Pimbley, *Graded Extended Drain Concept for Reduced Hot Electron Effect I*, 4,680,603, July 1987.

J. M. Pimbley, G. Gildenblat, C.-Y. Wei and J. Shappir, *Hybrid Extended Drain Concept for Reduced Hot Electron Effect*, 4,691,433, September 1987.

C.-Y. Wei and J. M. Pimbley, *Graded Extended Drain Concept for Reduced Hot Electron Effect II*, 4,859,620, August 1989.

Y. Nissan-Cohen, P. A. Frank, J. M. Pimbley, D. M. Brown, E. W. Balch, and K. J. Polasko, *Adjustable Windage Method and Mask for Correction of Proximity Effect in Submicron Photolithography*, 4,895,780, January 1990.

J. M. Pimbley and D. M. Brown, *Metallization Method for VLSIC Fabrication*, current status unknown.

S. D. Silverstein and J. M. Pimbley, *Spectral Estimation Utilizing an Autocorrelation-Based Minimum Free Energy Method*, 4,982,150, January 1991.

S. D. Silverstein and J. M. Pimbley, *Spectral Estimation Utilizing a Minimum Free Energy Method with Recursive Reflection Coefficients*, 5,068,597, November 1991.

H. M. Rougeot and J. M. Pimbley, *Light Detector Scintillator Radioactive Image Pick-up Apparatus with Improved Light Collection*, 1993-203755, August 1993.

D. M. Brown, M. Ghezzi and J. M. Pimbley, *Silicon Carbide MOSFET Integrated Circuit Devices*, current status unknown.

H. M. Rougeot and J. M. Pimbley, *Photodetector Scintillator Radiation Imager Having High Efficiency Light Collection*, 5,208,460, May 1993.

R. F. Kwasnick and J. M. Pimbley, *Method of Locating Common Electrode Shorts in an Imager Assembly*, 5,463,322, October 1995.

D. A. McDevitt-Pimbley and J. M. Pimbley, *Systems and Methods for Traffic Guidance Nodes and Traffic Navigating Entities*, 9,142,127, September 2015.

D. A. McDevitt-Pimbley and J. M. Pimbley, *Systems and Methods for Traffic Guidance Nodes and Traffic Navigating Entities*, 9,478,130, October 2016.

Society Memberships (Past and Present)

Editorial Board member of the *GARP Risk Professional*

Advisory Board of the Polytechnic Univ Center for Finance & Technology

Sigma Pi Sigma - National Physics Honor Society

(Senior Member) *Institute of Electrical and Electronic Engineers* (IEEE)

Sigma Xi (scientific research society)

IEEE Election Devices Society

Society for Industrial and Applied Mathematics (SIAM)

American Association for the Advancement of Science (AAAS)

Professional Activities and Honors

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|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2014 | Financial Risk Manager – Certified by the <i>Global Association of Risk Professionals</i> |
| 1997 | Passed the Series 7 and Series 63 General Securities Representative Examinations |
| 1996 | Member of the Polytechnic University Advisory Council of the Center for Technology & Financial Services |
| 1991 | Elected to <i>Senior Member</i> of the IEEE |
| 1989 - 1992 | Chairman of the <i>Annual Workshop on Mathematical Problems in Industry</i> at <i>Rensselaer Polytechnic Institute</i> |
| 1988 - 1990 | Chairman of the <i>Center for Integrated Electronics VLSI Seminar Series</i> at <i>Rensselaer Polytechnic Institute</i> |
| 1986 | (General Electric Research and Development Center) Dushman Award for “outstanding technical contributions” to the VLSI Program |
| 1985 | (<i>Rensselaer Polytechnic Institute</i>) Karen and Lester Gerhardt Prize awarded annually for the best Ph.D. thesis from the Schools of Science and Engineering |
| 1985 | (<i>Rensselaer Polytechnic Institute</i>) H. B. Huntington Prize awarded annually for the best research by a student in the Physics Department |
| 1982 | (General Electric Research and Development Center) Dushman Award for “outstanding technical contributions” to the CID Imager Program |
| 1976 | National Merit IBM Thomas J. Watson Scholarship |
| 1976 | New York State Regents Scholarship |

APPENDIX B: Publications of the Past Ten Years, J. M. Pimbley

J. M. Pimbley, “Testing and Mapping an Empirical Exercise Boundary for the American Put Option,” *J. Derivatives*, Fall 2021.

J. M. Pimbley and D. A. McDevitt-Pimbley, “Optimal Testing in Semiconductor Manufacturing,” *IEEE Engineering Management Review* **48**(4), 174-80, <https://doi.org/10.1109/EMR.2020.3022620>, December 2020.

J. M. Pimbley, “Efficient Routines for CDO Loss Calculations”, *J. Structured Finance* **26**(1), 29-43, Spring 2020.

J. M. Pimbley and G. Phillips, “The Myer Ruling and its Limitations,” *Commercial Law Quarterly*, **34**(1), March-May 2020.

J. M. Pimbley, “Simple Correlated Binomial Portfolio Loss Distribution”, *J. Structured Finance* **25**(2), 75-86, Summer 2019.

J. M. Pimbley, “T-Vasicek Credit Portfolio Loss Distribution”, *J. Structured Finance* **24**(3), 65-78, Fall 2018.

J. M. Pimbley and G. Phillips, “Fix the VIX: Reducing Manipulation in the Volatility Index”, *Risk Intelligence*, April 2018.

J. M. Pimbley, “Bernoulli & Behavioral Finance: Both Wrong”, *GARP Quant Perspectives*, August 2017.

J. M. Pimbley, “Quantitative Finance on a Smartphone – II”, *GARP Quant Perspectives*, June 2017.

J. M. Pimbley, “Six Great Reasons YOU Should Learn to Code”, *GARP Quant Perspectives*, April 2017.

J. M. Pimbley, “Ratings Reform: Blasting the Business Model”, *GARP Quant Perspectives*, February 2017.

J. M. Pimbley, “Demonetization and the Real Value of Money”, *GARP Quant Perspectives*, January 2017.

J. M. Pimbley, “Today’s Pressing Problem in Quantitative Finance”, *GARP Quant Perspectives*, December 2016.

J. M. Pimbley, “Risk Culture: What Matters Most?”, *GARP Quant Perspectives*, October 2016.

J. M. Pimbley, “Mathematical Finance, Models, Simulation and Today’s Pressing Problem”, chapter in *TutORials in Operations Research*, ISBN 978-0-9843378-9-7, 2016.

J. M. Pimbley, “How to Become a Better Risk Manager: Uniting Experience with Imagination”, *GARP Quant Perspectives*, September 2016.

J. M. Pimbley, "SmartFinance: Quantitative Finance on a SmartPhone", *GARP Quant Perspectives*, August 2016.

J. M. Pimbley, "Better Measurements for CLO Equity Performance", *J. Structured Finance* **22**(2), 24-30, Summer 2016.

J. M. Pimbley, "Think in Code, Young Risk Analyst!", *GARP Quant Perspectives*, June 2016.

J. M. Pimbley, "Rapid Monte Carlo Simulation", *GARP Quant Perspectives*, May 2016.

J. M. Pimbley, "Quant's View of Negative Interest Rates, Part: II", *GARP Quant Perspectives*, April 2016.

J. M. Pimbley, "Banking Basics: China and Its Alarming NPLs", *GARP Quant Perspectives*, March 2016.

J. M. Pimbley, "Liquidity Liberation for Mutual Funds", *GARP Quant Perspectives*, February 2016.

J. M. Pimbley, "How to Assess and Manage Credit Risk", *GARP Quant Perspectives*, January 2016.

J. M. Pimbley, "Mutuals should not over-promise on loan liquidity", *Creditflux*, January 2016.

J. M. Pimbley, "Before #BigData, Let's Confront #BadData", *GARP Quant Perspectives*, November 2015.

J. M. Pimbley, "Mortgage Madness", *GARP Quant Perspectives*, October 2015.

J. M. Pimbley, "A Flight Simulator for Financial Risk", *GARP Quant Perspectives*, August 2015.

J. M. Pimbley, "Greece, Black Holes and Banks' Ankles", *GARP Quant Perspectives*, July 2015.

J. M. Pimbley, "The Greatest Global Financial Risk", *GARP Quant Perspectives*, June 2015.

J. M. Pimbley, "Decisions: Life & Death on Wall Street", *GARP Quant Perspectives*, May 2015.

J. M. Pimbley, "A Quant's View of Negative Interest Rates", *GARP Quant Perspectives*, April 2015.

J. M. Pimbley, "Fixing Banking – Volcker Rule on Steroids", *GARP Quant Perspectives*, February 2015.

J. M. Pimbley, "Fixing Banking – Part II", *GARP Quant Perspectives*, January 2015.

J. M. Pimbley, "Fixing Banking – Part I", *GARP Quant Perspectives*, December 2014.

J. M. Pimbley, "A Bailout Plan to Increase Systemic Risk?", *GARP Quant Perspectives*, November 2014.

J. M. Pimbley, "Book Excerpt: Banking on Failure", *GARP Quant Perspectives*, October 2014.

J. M. Pimbley, "How to Build Disastrous Financial Models", *GARP Quant Perspectives*, September 2014.

J. M. Pimbley, "Banks and Political Bargains", *GARP Quant Perspectives*, August 2014.

J. M. Pimbley, "Are Systemically Important Banks Junk Credits?", *GARP Quant Perspectives*, July 2014.

J. M. Pimbley, "Monetary Policy Risk? Deflation!", *GARP Quant Perspectives*, June 2014.

J. M. Pimbley, "Benford's Law and the Risk of Financial Fraud", *Risk Professional*, 1-7, May 2014.

D. A. McDevitt-Pimbley and J. M. Pimbley, "Simplifying Expression for the Classical Bond Price-Yield Relationship", *Risk Professional*, 1-2, September 2013.

APPENDIX C: Litigation Testimony of the Past Four Years, J. M. Pimbley

- **Alleged Fraudulent Ratings of RMBS CDOs** – March 2017 to July 2023
Working with a law firm, I served as both subject matter and testifying expert to review documents and analyze credit rating practices for 2007-vintage CDOs of RMBS. I prepared expert analyses to support and defend discovery requests and reviewed expert reports. I submitted an affidavit, submitted an expert report, and gave expert deposition testimony for this case that then settled prior to trial.

2013-000515 and 2013-000698 *M&T Bank Corporation v. Moody's Investors Service, Inc.*; Supreme Court of the State of New York, County of Erie

- **Alleged Fraudulent Inducement of Bond Insurer** – June 2018 to 2022
Working with consulting colleagues and a law firm, I served as an expert to analyze claims that a bank sponsor of RMBS transactions breached warranties and induced fraudulently the participation of an insurer. I prepared an expert report and gave expert deposition testimony.

652914/2014 *Financial Guaranty Insurance Company v. Morgan Stanley ABS Capital I Inc. et. al.*; Supreme Court of the State of New York, County of New York

APPENDIX D: Documents Reviewed

- SDNY_02_01675748
- SDNY_06_00004552